

The Male of *Platycerus businskyi* (Coleoptera, Lucanidae), with
Additional Records of Two Other Congeners from
the Qinling Mountains of Central China

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Abstract *Platycerus businskyi* is redescribed based on 37 specimens including the first male from the type area. The taxon *bashanicus*, originally described as a subspecies of *P. businskyi*, is regarded as a distinct species. Two other species of the same genus, *P. hongwonpyoi qinlingensis* and *P. tabanai tabanai*, occurring on the Qinling Mountains are recorded with detailed collecting data and brief ecological notes.

Platycerus businskyi was described by IMURA (1996, p. 42) from Xunyangba, a small village located in the southeastern part of the Qinling Mountains in southern Shaanxi of Central China. The two *Platycerus* species known from the same mountains until that time, namely, *P. hongwonpyoi* and *P. tabanai*, were the members belonging to the group of *P. acuticollis* (or *P. caraboides*) and IMURA's species was the first record of the group of *P. delicatulus* from that mountain range and also from Shaanxi Province. This discovery suggested the possibility that there might be the area in China where more than three species of *Platycerus* occur sympatrically. Two years later, a new subspecies of *P. businskyi* was described from the Daba Shan Mountains on the borders between Chongqing Shi and Shaanxi Province under the name of *bashanicus* (IMURA & TANIKADO, 1998, p. 93). The species was later found to spread over western Hubei (IMURA, 2002, p. 38) and western Henan (IMURA, 2005, p. 497), though the subspecific account for the latter two populations were suspended because of too small number of the specimens available for study. Since the nominotypical subspecies of *P. businskyi* was known so far only from a single female specimen, we were unable to make detailed discussion on its taxonomy and inter-subspecific relationship based on the male and its genitalia. However, any more contribution has not been made on the nominotypical race for nearly ten years after the original description.

It was the beginning of November 2005 when I made a survey on *Platycerus* in the southeastern and central parts of the Qinling Mountains. I at first carried out a search for *P. businskyi* in Xunyangba and its nearby regions, the type area of the species, and succeeded in collecting a long series of additional specimens including the first male. During the same trip, I also collected the other two species already known from the same mountain range though their detailed type localities were not

shown in the original descriptions.

In this paper, I will first give a full description of *P. businskyi* based upon totally 37 specimens including the male, with detailed drawings of its mandibles and genital organ. The taxon *bashanicus* will be upgraded to a distinct species based on the difference in the external and genitalic morphologies of both sexes. In the latter part of the paper, records of two other species will be given with detailed collecting data and brief ecological notes.

Before going further, I wish to express my deep gratitude to Mr. Yoshiyuki NAGAHATA (Yonezawa) and Mr. FAN Ting (International Academic Exchange Center of the Academia Sinica, Chengdu), from whom I have received invaluable aid in the field investigation. Also I thank Dr. Shun-Ichi UÉNO (National Science Museum, Tokyo) for revising the manuscript of this paper.

1. *Platycerus businskyi* IMURA, 1996

(Figs. 1–4)

Platycerus businskyi IMURA, 1996, Nat. & Ins., Tokyo, **31**(6), p. 42, figs. 1, 2; type locality: Xunyangba in Ningshan Xian on the southern slope of the Qinling Mountains, 1,400–2,100 m alt., Shaanxi Province, Central China.

Male. Length (including mandibles): 11.0–12.7 (arithmetic mean 11.96) mm. Body above bluish green with a bronzy tinge and not very strongly polished; mandibles, knees and tibiae black with a faint greenish tinge; palpi, antennae, tarsi and claws brownish black; femora except for the distal ends yellowish brown; venter dark brownish black. Colour variation is hardly recognizable concerning all the specimens examined.

Head as in the other members of the genus; its dorsal surface rather coarsely scattered with punctures which are not confluent with one another; mandibles (Fig. 3) very large and stout, distinctly concave above in basal portions, with the outer margins less strongly arcuate in basal two-thirds, rather acutely hooked inwards at about apical third, tapered therefrom towards apices which are sharply pointed; retinacula longitudinally elongated, their inner margins multi-dentate, with six to eight small teeth on each side.

Pronotum transverse, 1.46–1.53 times as wide as long, widest near the basal third at which the lateral sides are rather remarkably angulate, more acutely narrowed towards base than towards apex, with the front angles subtriangularly protruded anteriad with blunt tips, the hind angles obtuse though obviously subangulate; disc strongly convex above for a member of the genus, almost similarly punctate as on head.

Elytra relatively elongated for the genus, 1.73–1.79 times as long as wide, widest obviously behind the middle, with the lateral sides nearly parallel-sided in apical four-fifths and roundly arcuate near apices; shoulders distinct and subangulate, with a very small humeral tooth on each side; surface rather uniformly scattered with small punctures which are often arranged in longitudinal rows; intervals rather frequently rugoso-

striate above all near the sutural part.

Male genital organ as shown in Fig. 4; viewed ventrally, lateral side of each paramere weakly inflated in basal portion, its inner margin remarkably emarginate near the base, and acutely and narrowly protruded inwards at the base; apical margin of basal piece subtrapezoidally protruded apicad; viewed dorsally, inner margin of each paramere widely and roundly emarginate throughout, with the inner basal angle obliquely protruded, basal piece triangularly protruded inwards; aedeagus subcylindrical, almost parallel-sided in both ventral and dorsal views, subovoid in shape in lateral view, with a pair of visor-like protuberances on the ventral to lateral wall hardly protruded.

Female. Length (including mandibles): 10.8–12.1 (arithmetic mean 11.54) mm. Body above a little more strongly polished than in male, brassy with a faint blue-greenish tinge on head and pronotum, faintly but rather constantly with a purplish lustre on elytra; coloration of appendages and venter almost as in male.

External morphology as mentioned in the original description (IMURA, 1996).

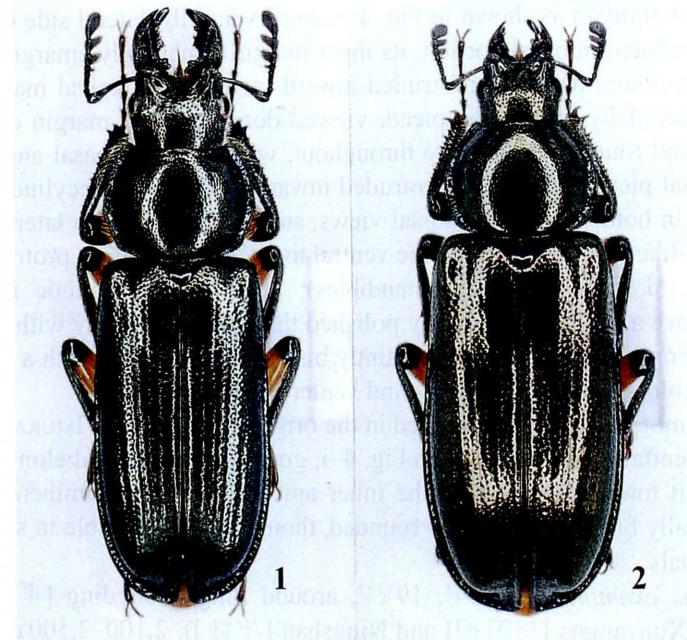
Female genital organ as shown in Fig. 4–i; gonocoxite large and elongated, gradually convergent towards apex, with the inner apical angle not prominently projected postero-internally but rather obtusely rounded, though a little variable in shape according to individuals.

Specimens examined. 18♂♂, 19♀♀, around Pingheliangding [平河梁顶] (= pass between Xunyangba [旬阳坝] and Ningshan [宁陕]), 2,100–2,500 m in altitude, on the southeastern part of the Qinling Mountains, in Ningshan Xian [宁陕县], of southern Shaanxi, Central China, 1~2-XI-2005, Y. IMURA & Y. NAGAHATA leg., preserved in the collection of Y. IMURA (Yokohama).

Notes. According to the discovery of the male, we now know that *Platycerus businskyi* is the species characterized mainly by less strongly shiny elytral surface of the male, stout male mandibles with long and hexa- to octadentate retinacula, relatively long elytra than in the other species in both sexes and characteristic features of the genital organ.

Two years after the discovery of this species, another new taxon of *Platycerus* belonging to the group of *P. delicatulus* was found from the Daba Shan Mountains and was described as a subspecies of *P. businskyi* under the name of *bashanicus* (IMURA & TANIKADO, 1998, p. 93). Since the male of the nominotypical race was not known at that time, the description of the new subspecies was given under comparison between the females alone. After examining a series of specimens containing both sexes, I have realized that the Daba Shan race is evidently different from the Qinling one as follows.

Male. 1) Size smaller on an average; 2) dorsal coloration more variable according to individuals, deep indigo blue or dark green with a faint bronzy tinge, while that of nominotypical *P. businskyi* is much more constantly bluish green with a bronzy tinge; 3) mandibles much smaller and shorter, less deeply concave above, with the retinacula much less elongated longitudinally and less multiply dentate; 4) pronotum flatter, with the lateral sides less strongly angulate near the widest part; 5) elytra relatively short, with the intervals less frequently rugoso-striate; 6) paramere with the lateral side



Figs. 1–2. *Platycerus businskyi* from Pingheliangding between Xunyangba and Ningshan Xian of southern Shaanxi, Central China (1, ♂, 2, ♀).



Fig. 3. Male mandibles of *Platycerus businskyi* from Pingheliangding between Xunyangba and Ningshan Xian of southern Shaanxi, Central China.

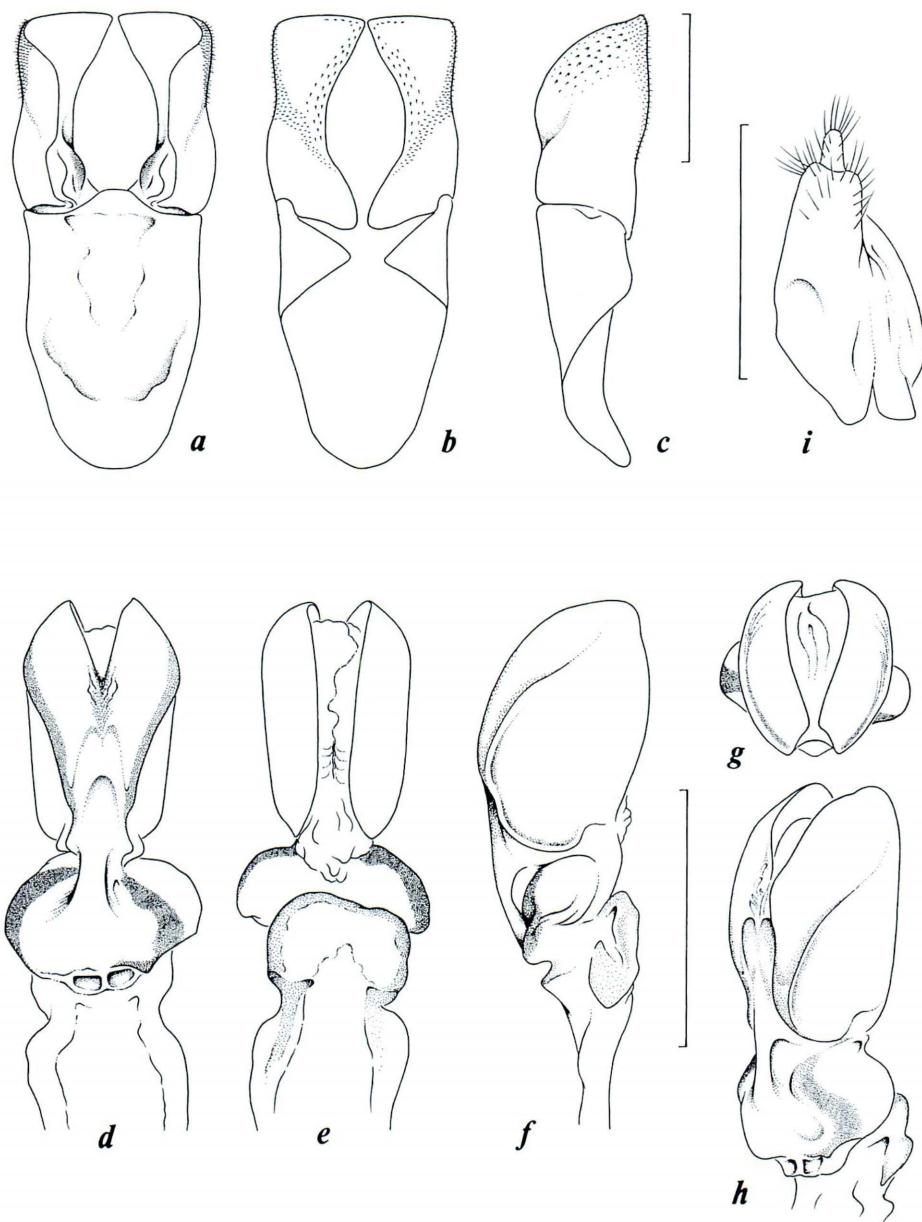


Fig. 4. Genital organ of *Platycerus businskyi* from Pingheiangding between Xunyangba and Ningshan in Ningshan Xian of southern Shaanxi, Central China. — a-c, Paramere (=lateral lobe) and basal piece; d-h, aedeagus (=median lobe), i, left gonocoxite of the female genitalia. — a & d, Ventral view; b, e & i, dorsal view; c & f, right lateral view; g, view from aedeagal apex; h, right subventral view. Scale: 1 mm.

more strongly inflated in basal portion and the inner basal angle less acutely and narrowly protruded inwards in ventral view; 7) apical margin of basal piece more remarkably protruded apicad in ventral view; 8) aedeagus narrower and more strongly convergent towards the base in ventral view, shorter and more obtusely rounded at tip in lateral view.

Female. 1) Size smaller on an average; 2) dorsal coloration more variable according to individuals, coppery with a weak greenish tinge or dark bluish green with a faint bronzy tinge, while that of the nominotypical *P. businskyi* is much more stable as mentioned above; 3) pronotum less widely depressed along the lateral margins; 4) elytra much shorter, with the surface more narrowly rugoso-striate; 5) gonocoxite shorter, above all in the apical portion.

These differences are evidently of specific importance, not subspecific, and the Daba Shan race is regarded as a distinct species (*Platycerus bashanicus* [stat. nov.]).

From the external appearance alone, *P. businskyi* seems to be more closely related to *P. kitawakii* which is sympatric with *P. bashanicus* on the Daba Shans. However, similarity in the basic structure of the male genital organ suggests that *P. businskyi* apparently belongs to the same group as that of *P. bashanicus*, not to that of *P. kitawakii* that might be a sister species of *P. turnai* (IMURA, 2001) of the Dashennongjia Massif of western Hubei.

A male specimen recorded as *P. businskyi* from Dashennongjia of western Hubei (IMURA, 2002, p. 38) is doubtless referable to *P. bashanicus* in view of both external and genitalic features. A female also recorded as *P. businskyi* from the Funiu Shan Mountains of western Henan (IMURA, 2005, p. 497) most probably belongs to *P. bashanicus*, but the final conclusion should be drawn after examination of the male specimen. In my view, it is most probable that *P. businskyi* is an endemic species on the Qinling Mountains and would be rather narrowly restricted to the high altitudinal area.

The main habitat of *P. businskyi* is deciduous broad-leaved forest mainly composed of *Betula*, *Tilia*, *Acer*, *Prunus* etc., partly mixed with coniferous tree, situated usually a little above the *Quercus* zone on the Qinling Mountains. In Pingheliangding, this species occurs sympatrically with *P. hongwonpyoi qinlingensis*. The former is found mainly from white-rotten part of old branch or trunk, most frequently from those of *Betula* and *Tilia*, while the latter is found mainly from softly rotten small branches on the ground. This is not consistent with the ecological difference generally observed between the group of *P. delicatulus* and that of *P. acuticollis*. From the same environmental condition, were discovered many larvae of *Platycerus* most probably referable to the same species. As is observed in all the other members belonging to the same genus in East Asia, *P. businskyi* leaves a peculiar oviposition mark on the surface of its food plant.

2. *Platycerus hongwonpyoi qinlingensis* IMURA, 1993

Platycerus hongwonpyoi qinlingensis IMURA, 1993, Gekkan-Mushi, Tokyo, (272), p. 12, figs. 3, 4–7; type

locality: northern slope of the Qinling Mountains in Shaanxi Province, Central China; 1994, *ibid.*, (278), p. 10, fig. 2. — TANIKADO & OKUDA, 1994, *Gekkan-Mushi*, Tokyo, (278), pl. 2 (on p. 3), figs. 11–15. — TANIKADO & TABANA, 1997, *ibid.*, (316), p. 3, fig. 18 (larva).

Specimens examined. 1♀, between Xunyangba and Pingheliangding, 1,900 m in altitude, on the southeastern part of the Qinling Mountains, in Ningshan Xian, 1–XI–2005; 3♂♂, southeastern side of Pingheliangding, 2,450–2,500 m in altitude, 2–XI–2005; 3♂♂, 2♀♀, pass between Banfangzi [板房子] and Longzaoping [龙草坪], 2,200–2,220 m in altitude, on the borders of Zhouzhi Xian [周至县] and Foping Xian [佛坪县], on the main ridge of the Qinling Mountains, 3–XI–2005, all from southern Shaanxi, Central China, collected by Y. IMURA & Y. NAGAHATA and preserved in coll. Y. IMURA (Yokohama).

Notes. This taxon was described from “northern slope of the Qinling Mountains” and the exact type locality was not shown in the original description. Later, TANIKADO and TABANA (1997, p. 3, figs. 17, 18, 20) presented the photographs of its oviposition mark, larva and habitat taken in Chang'an Xian on the northern slope of the same mountain range and commented that they inhabited the deciduous broad-leaved forest ranged between 1,500–2,000 m in altitude. According to the present survey, the distributional range of *P. h. qinlingensis* on the Qinling Mountains now extends over such prefectures as Chang'an Xian, Zhouzhi Xian, Foping Xian and Ning-shan Xian. The highest point of the habitat of this beetle reaches about 2,500 m. As was noted in the previous section, *P. h. qinlingensis* is found mainly from softly rotten small branches lying on the forest floor. It is sympatric with *P. businskyi* around Pingheliangding in the southeastern part of the Qinling Mountains, and with *P. tabanai* on the main ridge of the same mountains.

3. *Platycerus tabanai tabanai* TANIKADO et OKUDA, 1994

Platycerus tabanai TANIKADO et OKUDA, 1994, *Gekkan-Mushi*, Tokyo, (278), p. 8, figs. 6–10 (on pl. 2 of p. 3), fig. 3-a on p. 6, fig. 4 on p. 7; type locality: Qinling Mountains, Shaanxi Province, Central China — TANIKADO & TABANA, 1997, *ibid.*, (316), p. 3, fig. 16.

Specimens examined. 2♂♂, 3♀♀, pass between Banfangzi and Longzaoping, 2,200–2,220 m in altitude, on the borders of Zhouzhi Xian and Foping Xian, on the main ridge of the Qinling Mountains, in southern Shaanxi, Central China, 3–XI–2005, Y. IMURA & Y. NAGAHATA leg., preserved in coll. Y. IMURA (Yokohama).

Notes. Like the preceding species, the exact type locality of *P. tabanai* was not shown in the original description. Later, TANIKADO and TABANA (1997, p. 3, figs. 16, 20) presented the photographs of the male walking on the food plant and the habitat taken in Chang'an Xian, and commented that the species inhabit the deciduous broad-leaved forest ranged between 1,500–2,000 m sympatrically with *P. h. qinlingensis*. I was able to find this species only from the pass on the borders of Zhouzhi Xian and Foping Xian on the main ridge of the Qinlings, and the distributional range seems to be narrower than that of *P. h. qinlingensis*. At the same pass, this species is found from

softly-rotten small branches lying on the forest floor, and is completely sympatric with *P. h. qinlingensis*.

要 約

井村有希：ブジンスキルリクワガタの♂に関する知見と秦嶺山脈における同属2種の記録。——ブジンスキルリクワガタは、中国陝西省秦嶺山脈南東部の旬阳坝から得られたただ1頭の♀に基づいて記載されていらい追加記録がなく、♂は未知のままであった。筆者は2005年11月、同山脈を訪れ、基準産地一帯において同種を再発見し、♂を含む複数の個体を得ることができたので、本論文において両性の標本に基づく同種の再記載をおこなった。重庆市北部と陝西省との境界にある大巴山から本種の1亜種として記載された***bashanicus***は、外部形態、交尾器形態ともにブジンスキルリクワガタとは大きく異なっていることが判明したため、独立種バサンルリクワガタ *P. bashanicus*へと昇格した。湖北省西部の神农架および河南省西部の伏牛山塊からブジンスキルリクワガタとして各1頭ずつ記録されている個体も、種としてはバサンルリクワガタに属するものと考えられる。本論文ではさらに、秦嶺山脈に産する同属の2種（チョウセンコルリクワガタ秦嶺山脈亜種とテツイロコルリクワガタ基亜種）を、正確な産地名に若干の生態的知見を添えて記録した。

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